A MOTOR POWERED BY PERMANENT MAGNETS

by Jorma Hyypia

This article originally appeared in the Spring 1980 edition of Science & Mechanics, *a magazine which is now defunct. We reprint it, though in edited form, in the hope that a new generation of tinkerers will be inspired by the device. We have verified that the inventor, Howard Johnson, was awarded the patent on his permanent magnet–powered motor in 1979 as well as a further patent relating to the device in 1993. — Editor*

"We don't grant patents on perpetual motion machines," said the examiners at the US Patent Office. "It won't work because it violates the law of conservation of energy," said one physicist after another. But because inventor Howard Johnson is not the sort of man to be intimidated by such seemingly authoritative pronouncements, he now owns US Patent No. 4,151,431 which describes how it is possible to generate motive power, as in a motor, using only the energy contained in the atoms of permanent magnets. That's right. Johnson has discovered how to build motors that run *without* an input of electricity or any other kind of *external* energy!

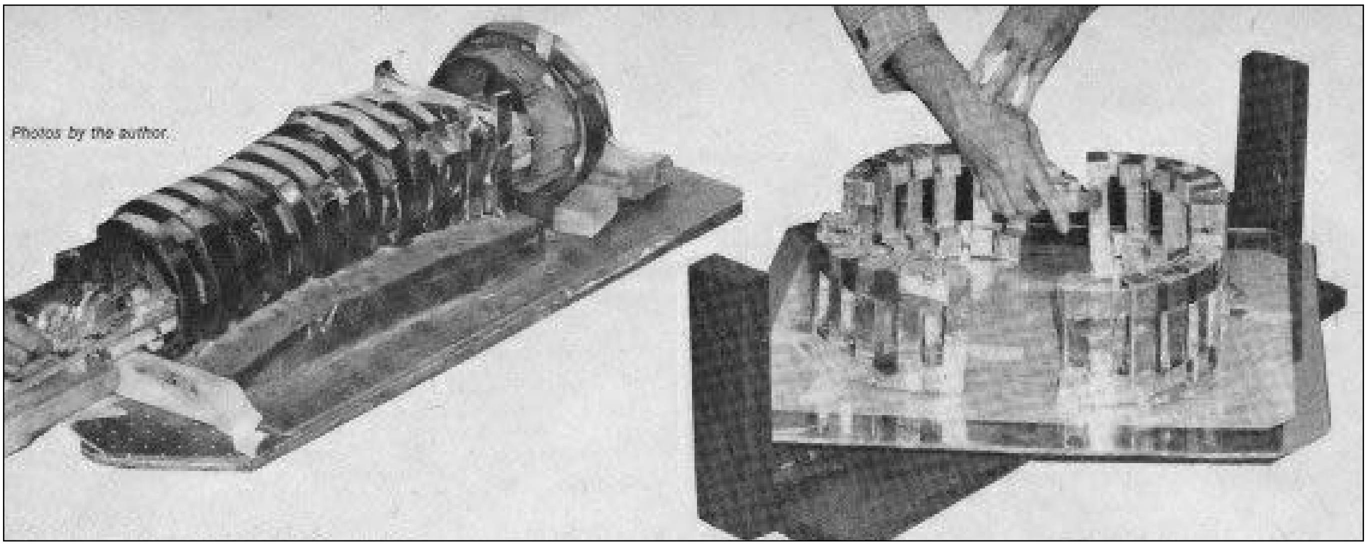
When this writer was urged by the editor of *Science & Mechanics* to make a thousand-mile pilgrimage to Blacksburg, Virginia, to meet with the inventor, he went there as an 'open-minded sceptic' and as a former research scientist determined not to be fooled. Within two days, this former sceptic had become a believer.

Does Johnson's permanent magnet motor work? Is Johnson a bona fide researcher, or merely a 'garage mechanic' mad inventor? As the following brief summary suggests, the inventor's credentials appear to be impeccable.

Following seven years of college and university training, Johnson worked on atomic energy projects at Oak Ridge, did magnetics research for Burroughs company, and served as scientific consultant to Lukens Steel. He has participated in the development of medical electrical products, including injection devices. For the military he invented a ceramic muffler that makes a portable motor generator silent at 50 feet; this has been in production for the past 18 years. His contributions to the motor industry include: an hysteresis brake; non-locking brake materials for anti-skid application; new methods of curing brake linings; and a method of dissolving asbestos fibres. He has also worked on silencers for small motors, a supercharger, and has perfected a 92-pole no-brush generator to go in the wheel of Lincoln automobiles as a skid control. In all, Johnson is connected with more than 30 patents in the fields of chemistry and physics.

Perhaps the best way to describe what these three gadgets do is by reciting this writer's personal experiences during the interview demonstration. That way I will not merely be telling what the inventor says they do, but I will reveal what happened when I tried the experiments myself.

The first item consists of more than a dozen foil-wrapped magnets assembled to form a broad arc. Each magnet is extended upward slightly at each end to form a low U-shape, the better to concentrate magnetic fields where they are needed. The overall curvature of the mass of magnets apparently has no particular significance except to show that the distance between these stator magnets and the moving vehicle is not critical. A transparent plastic sheet atop this magnet assembly supports a length of plastic model railroad track. The vehicle, basically a model railroad flatcar, supports a foil-wrapped pair of curved magnets plus some sort of weight, in some cases merely a rock. The weight is needed to keep the vehicle down on the track, against the powerful magnetic forces that would otherwise push it askew. That is all there is to the



construction of this representation of a "linear motor".

I was prepared to develop eye strain in an effort to detect some sort of motion in the vehicle. I need not have been concerned. The moment the inventor let go of the vehicle he carefully placed at one end of the track, it accelerated and literally *zipped* from one end to the other and flew onto the floor! Wow!

I tried the experiment myself, and could feel the powerful magnetic forces at work as I placed the vehicle on the track. I gently eased the vehicle to the critical starting point, taking great care not to exert any kind of forward push, even inadvertently. I let go. Zip! It was on the floor again, at the other end of the track. Knowing that I would be asked if the track might have had a slant, I reversed the vehicle and started it from the opposite end of the track. It worked just as effectively in the reverse direction. In fact, the vehicle can even navigate a respectable upgrade.

In light of these tests, and considering the remarkable speed of the vehicle, you can discount any notion that this was a simple 'coasting' effect.

The second device has the U-shaped magnets standing on end in a rough circular arrangement oddly reminiscent of England's Stonehenge. This assembly is mounted on a transparent plastic sheet supported on a plywood panel, pivoted underneath on a free-turning wheel obtained from a skateboard.

As instructed, I eased the 8-ounce focusing magnet into the ring of larger magnets, keeping it at least four inches away from the ring. The 40-pound magnet assembly immediately began to turn, and accelerated to a very respectable rotating speed which it maintained for as long as the focusing magnet was held in the magnetic field. When the focusing magnet was reversed, the large assembly turned in the opposite direction.

Since this assembly is clearly a crude sort of motor, there's no doubt that it is indeed possible to construct a motor powered solely by permanent magnets.

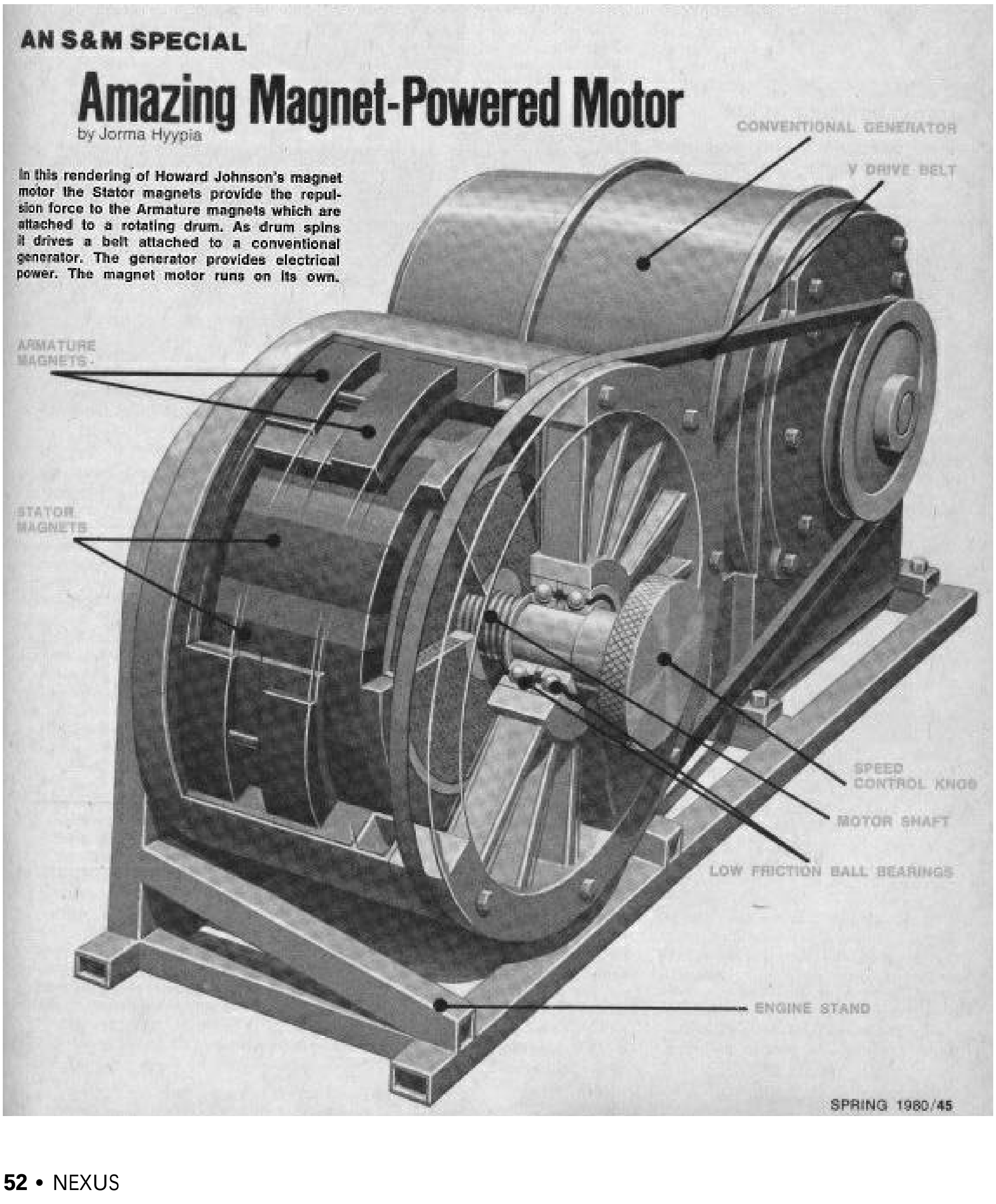
The third assembly, which looks like the bones of some prehistoric sea creature, consists of a tunnel constructed of rubber magnet material that can be easily bent to form rings.

The tunnel device of course worked very well in the inventor's office during my visit, although Johnson observed that the rubber magnets are perhaps a thousand times weaker than the cobalt samarium magnets used in the other assemblies. There's just one big problem with the more powerful magnets: they cost too much.

How do they work? The drawing that shows a curved 'arcuate' armature magnet in three successive positions over a line of fixed stator magnets provides at least highly simplified insights into the theory of permanent magnet motive power generation.

Johnson says curved magnets with sharp leading and trailing edges are important because they focus and concentrate the magnetic energy much more effectively than do blunt-end magnets. These arcuate magnets are made slightly longer than the lengths of two stator magnets plus the intervening space—in Johnson's setups about 3⅛ inches long.

Note that the stator magnets all have their North faces upward, and that they



are resting on a high magnetic permeability support plate that helps concentrate the force fields. The best gap between the end poles of the armature magnet and the stator magnets appears to be about ⅜ of an inch.

As the armature north pole passes over a magnet, it is repelled by the stator north pole; and there's an attraction when the north pole is passing over a space between the stator magnets. The exact opposite is of course true with respect to the armature south pole. It is attracted when passing over a stator magnet and repelled when passing over a space.

The various magnetic forces that come into play are extremely complex. The leading (N) pole of the armature is repelled by the north poles of the two adjacent magnets. But, at the indicated position of the armature magnet, these two repulsive forces (which obviously work against each other) are not identical; the stronger of the two forces (double dashed line) overpowers the other force and tends to move the armature to the left. This left movement is enhanced by the attraction force between the armature north pole and the stator south pole at the bottom of the space between the stator magnets.

But that's not all! Let's see what is happening simultaneously at the other end (S) of the armature magnet. The length of this magnet (about 3⅛ inches) is chosen, in relation to the pairs of stator in magnets plus the space between them, so that once again the attraction/repulsion forces work to move the armature magnet to the left. In this case the armature pole (S) is attracted by the north surfaces of the adjacent stator magnets but, because of the critical armature dimensioning, more strongly by the magnet (double solid line) that tends to 'pull' the armature to the left. It overpowers the lesser 'drag' effect of the stator magnet to the right. Here also there is the added advantage of, in this case, repulsion force between the south pole of the armature and the south pole in the space between the stator magnets.

The importance of correct dimensioning of the armature magnet cannot be overemphasised. If it is either too long or too short, it could achieve an undesirable equilibrium condition that would stall movement. The objective is to optimise all force conditions to develop the greatest possible *off-balance* condition, but always in the same direction as the armature magnet moves along the row of stator magnets. However, if the armature is rotated 180 degrees and started at the opposite end of the track, it would behave in exactly the same manner except that it would, in this example, move from left to right. Also note that once the armature is in motion, it has *momentum* that helps carry it into the sphere of influence of the next pair of magnets where it gets another push and pull, and additional momentum.

Complex Forces. Some very complex magnetic forces are obviously at play in this deceptively simple magnetic system, and at this time it is impossible to develop a mathematical model of what actually occurs. However, computer analysis of the system, conducted by Professor William Harrison and his associates at Virginia Polytechnic Institute (Blacksburg, VA), provides vital feedback information that greatly helps in the effort to optimise these complex forces to achieve the most efficient possible operating design.

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As Professor Harrison pointed out, in addition to the obvious interaction between the two poles of the armature magnet and the stator magnets, many other interactions are in play. The stator magnets affect each other and the support plate. Magnet distances and their strengths vary despite best efforts of manufacturers to exercise quality controls. In the assembly of the working model, there are inevitable differences between horizontal and vertical air spaces. All these interrelated factors must be optimised, which is why computer analysis in this refinement stage is vital. It's a kind of information feedback system. As changes are made in the physical design, fast dynamic measurements are made to see whether the expected results have actually been achieved. The new computer data is then used to develop new changes in the design of the experimental model. And so on, and on.

That very different magnetic conditions exist at the two ends of the armature is shown by the actual experimental data displayed in the table and associated graph [not shown here]. To obtain this information, the researchers first passed the probe of an instrument used to measure magnetic field strengths over the stator magnets and the intervening spaces. We shall call this the 'zero' level, although there is a very tiny gap between the probe and the tops of the stator magnets. These measurements in effect indicate what each pole of the armature magnet 'sees' below as it passes over the stator magnets.

Next the probe is moved to a position just beneath one of the armature poles, at the top of the ⅜-inch armature-to-stator air gap. Another set of magnetic flux measurements is made. The procedure is repeated with the probe positioned just beneath the other armature pole.

Now 'instinct' might suggest, and correctly so, that the flux measurements at the top and bottom of the air gap will differ. But if instinct also suggests that these differences are pretty much the same at the two armature pole positions, you would be very much in error! In this particular experiment the total magnetic flux amounted to 30,700 gauss when the probe was held at the zero level under the north pole of the magnet, and a total of 28,700 gauss when the probe was moved to the top of the ⅜-inch air gap. The difference between these total measurements is 2,000 gauss. Similar readings made at the air gap between the south pole of the armature and the stator magnets indicates a total flux at zero level of 33,725 gauss, and 24,700 gauss at the top of the air gap. This time the difference is a much larger 9,025 gauss, or four and one half times greater than for the north pole! Clearly, the magnetic force conditions are far from identical at the two ends of the armature magnet.

The Ultimate Motor. A motor based on Johnson's findings would be of extremely simple design compared to conventional motors. As shown in the diagrams developed from Johnson's patent literature [not included here], the stator/base unit would contain a ring of spaced magnets backed by a high magnetic permeability sleeve. Three arcuate armature magnets would be mounted in the armature which has a belt groove for power transmission. The armature is supported on ball bearings on a shaft that either screws or slides into the stator unit. Speed control and start/stop action would be achieved by the simple means of moving the armature toward and away from the stator section.

Note: To view and download Johnson's patent, visit <www.newebmasters.com/freeenergy/index.html>.